

**FIVE-YEAR REVIEW REPORT**

**UNIVERSITY OF MINNESOTA ROSEMOUNT RESEARCH CENTER SITE**

**ROSEMOUNT  
MINNESOTA**

**Pursuant to CERCLA**

**Prepared by:  
United States Environmental Protection Agency  
Region 5  
Chicago, Illinois**

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Superfund Division, Region 5

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Date

FIVE-YEAR REVIEW REPORT  
EXECUTIVE SUMMARY  
June 2002

UNIVERSITY OF MINNESOTA ROSEMOUNT RESEARCH CENTER SITE

Rosemount  
Minnesota

The completion of the current five-year review confirms that the University of Minnesota Research Center Site remains protective of human health and the environment. The source area and groundwater remedies selected in the 1986 University of Minnesota Rosemount Research Center (the Site) Record of Decision (ROD) have been implemented under the 1985 Response Action Agreement issued under the Minnesota Emergency Response Liability Act (MERLA) and adjusted as appropriate. This is the second five-year review for the University of Minnesota Rosemount Research Center Site. The first five-year review was completed and signed in June 1997.

The remedies for the University of Minnesota Rosemount Research Center site in Rosemount, Minnesota included excavating, consolidating, thermally destroying, transporting soil to an off-site RCRA-permitted landfill, backfilling with clean soil, grading and establishing vegetation and the installation of a groundwater pumpout system. The site achieved construction completion with the signing of the Preliminary Close Out Report on June 29, 1994.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the ROD. Two Explanation of Significant Difference (ESDs) were issued to change the soil portion of the remedy. The first one allowed the University the option of using on-site incineration of the previously approved alternative of on-site thermal desorption and fume incineration, to restrict access to the three disposal sites and required the University to perform a review of the effectiveness of the remedial action three years after completion of the remedy rather than three years after the approval of the remedial action clean-up plan. The second ESD required that all remaining soil contaminated with 1 to 10 ppm polychlorinated biphenyls (PCBs) will be covered with 10 inches of clean fill in order to comply with the PCB policy. The remedy is functioning as designed. The immediate threats have been addressed and the remedy remains protective of human health and the environment.

The Site ground water remedy remains protective. The ground water pump and treatment system was shutdown on October 30, 1991. The ground water pump and treatment system was in place and operating at the time the ROD was written. The pump and treatment system had already been completed by the University as a part of its response under the MERLA Response Action Agreement.

## FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name (from WasteLAN): University of Minnesota Rosemount Research Center		
EPA ID (from WasteLAN): MND98061378		
Region: 5	State: MN	City/County: Rosemount/Dakota
SITE STATUS		
NPL status: <input type="checkbox"/> Final x Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating x Complete		
Multiple OUs?* x YES <input type="checkbox"/> NO	Construction completion date: _06_ / _19_ / 1994__	
Has site been put into reuse? X YES <input type="checkbox"/> NO      Portions		
REVIEW STATUS		
Lead agency: <input type="checkbox"/> EPA x State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Gladys Beard		
Author title: NPL State Deletion Process Manager	Author affiliation: USEPA, Region 5	
Review period:** _12_ / _04_ / _01_ to 06_ / _30_ / _02_		
Date(s) of site inspection: _04_ / _23_ / _02_		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>X Post-SARA    <input type="checkbox"/> Pre-SARA    <input type="checkbox"/> NPL-Removal only</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Non-NPL Remedial Action Site    <input type="checkbox"/> NPL State/Tribe-lead</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Regional Discretion</span> </div>		
Review number: <input type="checkbox"/> 1 (first) x 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify)		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Actual RA Onsite Construction at OU # _____</span> <span><input type="checkbox"/> Actual RA Start at OU# _____</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Construction Completion</span> <span>X Previous Five-Year Review Report</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Other (specify) _____</span> </div>		
Triggering action date (from WasteLAN): _06_ / _06_ / 1997__		
Due date (five years after triggering action date): _06_ / _30_ / _02_		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

U. S. Environmental Protection Agency  
Region 5  
Five Year Review  
University of Minnesota Rosemount Research Center Site  
Rosemount, Minnesota  
June 2002

## **I. Introduction**

The United States Environmental Protection Agency (U.S. EPA) Region 5 has conducted a five-year review of the remedial actions implemented at the University of Minnesota Rosemount Research Center Site in Rosemount, Minnesota. The review was conducted between December 4, 2001 and June 2002. This report documents the results of the five-year review. The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, finding, and conclusions of the review are documented in the five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and make recommendations to address them.

This review is required by statute. U. S. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA 121(c), as amended, which states:

If a remedial action is selected that results in any hazardous substances, pollutants, or contaminants remaining at the site, the remedial action shall be reviewed no less often than every five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the second five-year review for the University of Minnesota Rosemount Research Center Site. The first five-year review report was completed and signed in June 1997. Due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure, this five-year review is required.

## **II. Site Chronology**

Table 1 lists a chronology of events for the University of Minnesota Rosemount Research Center Superfund (UMRAC) Site.

Event	Date
Initial discovery of Problem	1984
Response Action Agreement	1985
Listed of National Priority List	1986
Remedial Investigation/Feasibility	1997
ROD Signature	1990
Explanation of Significant Difference	1991/1993
Preliminary Site Close Out Report	1994
Final Site Close Out Report	1996
First Five-Year Review	1997
Deleted from the National Priority List	2001
Site Visit	2002

## **III. Background**

### **A. Site History**

The UMRRC Site is located within the city limits of Rosemount in Dakota County, approximately 15 miles southeast of the Minneapolis/St. Paul metropolitan area (Figure 1). The UMRRC Site covers approximately five square miles and is used by some light manufacturing and service companies. All operable units are contained within a small area inside the UMRRC Site. The UMRRC Site (“Site”) is composed of several subsites such as the Burn Pit site.

The University of Minnesota (University) burned discarded laboratory chemicals at the Burn Pit site. The University contracted with tenants who disposed of lead, copper, and polychlorinated biphenyls (PCBs) in three industrial disposal sites: the George's Used Equipment (GUE) site, the Porter Electric and Machine Company (PE) site, and the U.S. Transformer (UST) site.

The University and the MPCA signed a Response Action Agreement (Agreement) on May 30, 1985, under the Minnesota Environmental Response and Liability Act (MERLA) for the cleanup of the Site.

In June 1986, the Site, the area to which the Agreement applies, was placed on the National Priority List.

The Site consists of three operable units. The Site Record of Decision (ROD), dated June 29, 1990, documented the selection of Remedial Actions ( RAs) for the soil operable unit and ground-water operable units. Subsequent to the execution of the Site ROD, the soil operable unit was divided into two operable units: Operable Unit 2 (OU2) - soil contaminated by lead, copper and polychlorinated biphenyls (PCBs) from the GUE site, and Operable Unit 3 (OU3) - soil contaminated by PCBs from the GUE, PE, and UST sites. Therefore, OU3 consists of only PCB-contaminated soil and concrete from the three industrial disposal areas. Operable Unit 1 (OU1) consisted of the Burn Pit site and the contaminated ground water from the Burn Pit site.

The soil remedy was divided into two operable units because the RAs for these operable units were different. The RA for OU2 soil was the off-site disposal of lead, copper, and PCB contaminated soil (PCB contaminated soil that could not be economically separated from the lead and copper contaminated soil) in landfills designed to receive this waste. The RA for OU3 was the on-site thermal desorption with fume incineration of PCBs. The remedy implemented for OU1 was a ground water pump and treatment system.

After reviewing the results of the Remedial Investigation/Feasibility Study (RI/FS), the Minnesota Pollution Control Agency (MPCA) completed a ROD on June 11, 1990. EPA concurred on the ROD on June 29, 1990.

## **B. Results of Site Investigations**

### **Operable Unit 1**

RI/FS activities of all operable units began as early as 1984 and continued through 1988.

The University operated a waste disposal/burn pit area, later known as the Burn Pit site, for the disposal and burning of liquid laboratory wastes during the late 1960s and early 1970s. The pit was filled with clean dirt and capped with clay and closed in 1980.

Volatile organic chemicals (VOCs) that were not completely burned, infiltrated into the ground water and contaminated the drinking water of some nearby Rosemount residents. In 1984, 16 residential wells to the northeast of the Burn Pit site were found to be contaminated with chloroform. The primary contaminant of concern for OU1 was chloroform. Other chemicals from the Burn Pit site were found in the ground water, but were at lower levels that did not qualify as chemicals of concern.

The maximum concentration of chloroform found was 72 parts per billion (ppb). This concentration was found in a monitoring well one mile east of the Burn Pit site. The chloroform ground water plume was found to extend approximately four miles to the east and northeast of

the Burn Pit site.

### **Operable Units 2 and 3**

The GUE site was used as an electrical equipment storage and salvage facility as well as a general salvage facility between 1968 and 1985. The PE site was used for storage and reconditioning of used industrial electrical equipment. The UST site was used for dismantling and salvaging electrical transformers. The RI determined that soil and concrete on these three industrial disposal sites were contaminated by PCBs. At the GUE site, the surface soil PCB concentrations ranged from 1.7 to 42,000 parts per million (ppm). The soil PCBs were generally found in the first nine feet of soil; PCBs were also found in a depression and trace amounts extended to a depth of 61 feet below the surface. The PCBs were identified as Aroclors 1260 and 1254. Soil lead concentrations ranged up to 40,000 ppm and soil copper concentrations up to 310,000 ppm. These metal contaminants were generally confined to surface soil. Lead and copper were not found in amounts to make these contaminants of concern at the UST and PE sites.

At the PE site, the soil PCB concentrations range from 3.8 to 63,000 ppm. The PCBs were identified as Aroclors 1242, 1248, 1254, and 1260. PCBs were found to a depth of 74.5 feet below the surface, but generally were at concentrations below 10 ppm below 43 feet.

At the UST site, the soil PCB concentrations were widespread but at low concentrations. The PCBs were identified as Aroclor 1260.

At the end of the RI, the University estimated that the volume of materials contaminated in excess of 1 ppm PCB and 50 ppm lead was 2,500 cubic yards of lead contaminated soil; 160 cubic yards of PCB contaminated concrete; and 57,000 cubic yards of PCB contaminated soil.

Lead and PCBs were not found in the ground water under these three industrial sites.

In summary, the Site contaminants of concern were identified as chloroform (OU1) and lead, copper, and PCBs (OU2 and 3).

### **C. Remedial Planning Activities**

#### **Operable Unit 1**

The ROD that was signed in 1990 included a ground water pump and treatment system for the chloroform contamination. The pump and treatment included install a pump in a monitoring well downgradient of the Burn Pit Site, treating pump out water in a packed tower aeration system and discharge treated water to an infiltration pond. It should be noted that the ground water pump and treatment system was in place and operating at the time the ROD was written. The pump and treatment system had already been completed by the University as a part of its response under the MERLA Response Action Agreement. The cleanup criteria established for chloroform

is 57 ppb. This value was derived from the MDH RAL. The groundwater pump out system was to continue until the groundwater met the RAL for chloroform. The ground water was also found to meet other state ground water drinking water criteria.

### **Operable Units 2 and 3**

The selected remedy for the soil and concrete cleanup had five major components:

1. Excavating approximately 6,500 cubic yards of soil and concrete contaminated with greater than 25 ppm PCBs and approximately 2,600 cubic yards of soil contaminated with copper and lead where the soil exceeded 1,000 ppm lead;
2. Consolidating approximately 15,000 cubic yards of soil from the three disposal sites contaminated with between 10 and 25 ppm PCBs at GUE and restricting access;
3. Thermally destroying the PCBs in the soil and concrete by on-site thermal desorption and fume incineration;
4. Transporting the soil contaminated with lead and copper to an off-site RCRA-permitted landfill (and transporting soil exceeding 49 ppm PCBs to a Toxic Substance Control Act (TSCA)/ Resource Conservatory and Recovery Act (RCRA) permitted landfill); and
5. Backfilling with clean soil, grading and establishing vegetation.

Based on a request from the University, the ROD was modified in August 1991 with the completion of an Explanation of Significant Difference (ESD) by the MPCA staff and EPA.

The changes approved in the ESD were:

1. Allowing the University the option of using either on-site incineration (incineration of soil not just fumes) or the previously approved alternative of on-site thermal desorption and fume incineration;
2. Allowing the University to restrict access to the three disposal sites with PCB levels of between 10 and 25 ppm PCBs rather than consolidating this soil at the GUE site; and
3. Requiring the University to perform a review of the effectiveness of the remedial action three years after completion of the remedy rather than three years after the approval of the remedial action clean-up plan.

The University chose to destroy the PCBs by the on-site incineration option.

On June 1, 1993, the University requested that it be allowed to consolidate soil contaminated with between 10 and 25 ppm PCBs in George's Used Equipment (GUE) Deep as originally described in



the ROD. The University decided that it was now more feasible to consolidate the soil than was envisioned at the time of the first ESD. The ESD also indicated that all remaining soil contaminated with 1 to 10 ppm PCBs will be covered with 10 inches of clean fill in order to comply with the TSCA PCB Spill Policy and to provide unrestricted access to these areas. The MPCA prepared a second ESD to address these changes and EPA concurred with the ESD on October 1, 1993.

The ROD required that lead-contaminated soil that was also contaminated by PCBs in excess of 49 ppm be disposed in a TSCA-/RCRA-permitted landfill. This concentration should have been identified as 50 ppm PCBs pursuant to the land disposal restrictions of RCRA. The latter concentration was used to determine what type of landfill was used for the off-site disposal of lead and PCB contaminated soil.

The ROD identified copper as a soil contaminant associated with lead contamination of soil. Lead was viewed as an indicator chemical for copper contamination. Therefore, the disposal of lead contaminated soil in off-site landfills also resulted in the disposal of copper contaminated soil.

The ROD also required that the University review remedies, not previously reviewed, that could further remediate the lead and PCBs left on site and evaluate them for cost, environmental effects, and effectiveness. In November 1996, the University submitted three reports regarding lead clean-up technology carried out at the Coleraine Minerals Research Laboratory. In February 1997, the University submitted a "feasibility study" report evaluating lead and PCB remedies as described above.

The feasibility study report evaluated three new technologies that could possibly remediate approximately 750 cubic yards of residual PCB and lead contaminated soil that remain in the restricted area of the Site. The technologies included a biological process for treating PCBs, a dechlorination/detoxification treatment for PCBs and a particle size separation process for lead impacted soil.

The PCB-Rem process employs hydrogen peroxide and ferrous sulfate to partially dechlorinate PCB molecules in the soil matrix. Biodegradation then allows microorganisms to further degrade the compounds. The process requires excavation of the soil and treatment in a reaction vessel. Previous bench scale study data suggests that the process could degrade PCB in soil to less than 2 ppm.

The Solid Phase Extraction process uses solvents to strip PCBs, from the excavated soil in a contact tank. Small polystyrene beads are mixed into the slurry. The PCBs suspended in the solvent repartition onto the styrene beads. The beads are floated to the surface of the mixture using water and are collected and disposed. Soil vapor extraction is then used to remove residual solvent from the soil matrix. The process was determined to have promise, but the effectiveness for soil at this Site would require treatability studies.

The third alternative was a lead reduction process that use physical separation techniques to separate soil by size. Analysis of the various size fractions is used to determine what size fraction the lead is

concentrated. The size fraction containing higher concentrations of lead are separated and disposed. The process is reported to be effective at removing lead from soil, but has not progressed past the bench scale phase of development. In addition the soil types at the Site are significantly different than those in the study site and the distribution by particle size versus lead concentrations is not known. Screening water would also have to be treated in this method.

The recommendations from the feasibility report were that all of the methods evaluated were less cost effective than the on-site incineration or off-site disposal alternatives that were previously implemented at the Site. In addition, treatability studies would be required to determine the actual effectiveness of the remedies on site soil. The high cost associated with additional studies and the remedies themselves lead to the recommendation that these alternatives not be pursued. The MPCA staff concurred with the recommendation.

Further requirements for the RA were identified after the ROD was written.

In order to operate a thermal destruction unit in Minnesota, the MPCA staff issued an "Authorization to Install and Operate a Thermal Destruction Unit (TDU), University of Minnesota Rosemount Research Station," (Authorization to Burn) on December 27, 1991. The Authorization to Burn was modified on February 3, 1992, and August 17, 1992. These modifications reduced the scope of the Authorization to Burn based on additional information received from the University.

The Weston TDU was permitted to operate under a TSCA permit. The TSCA permit required that the TDU leave no more than 2 ppm PCBs in the ash from the incineration process. This concentration meets the ROD clean-up requirements.

The ROD did not identify on-site disposal requirements for wastewater generated from the TDU; however, the MPCA Division of Water Quality staff identified these requirements in a memorandum dated December 10, 1992. The wastewater was required to contain less than 15 ppb lead; 0.5 ppm PCBs; 250 ppm chlorides; and no detectable dioxins or furans at a detection limit of 1.0 nanograms/gram/congener.

The ROD did not identify any requirements for a cover over areas to be designated unrestricted use (cleaned up to 10 ppm PCBs). EPA clarified that these areas would need a cover of at least 10 inches of "clean soil" of less than 1 ppm PCBs. This is a requirement specified in the TSCA PCB Spill Policy. TSCA does not require a cover over areas left with between 10 and 25 ppm PCBs; however, the ROD required a 16-inch cover of clean soil over GUE Deep.

As stated in the ROD, the Office of Health and Environmental Assessment (OHEA) has concluded that a PCB level of 25 ppm in soil would present less than a 1E-07 level of oncogenic inhalation risk to people on site who work more than 0.1 kilometers from the actual spill area (estimating a spill area of less than 0.5 acres). Therefore, the cover reduces this inhalation oncogenic risk to below 1E-07. Also as stated in the ROD, a 10-inch cover would reduce the overall PCB risk for 10 ppm PCB soils to 1.54E-05. A sixteen inch cover should reduce the risk from 10 to 25 ppm PCB contaminated soil

to below 1E-05 for all soils covered at the Site.

#### **IV. Remedial Actions**

On December 4, 1986, the MPCA staff completed a Minnesota Decision Document that approved the original OU1 RA. The major components of the RA were: the installation of new individual residential wells drilled into the Franconia Aquifer and a ground water pump and treatment system with packed tower aeration and discharge to an infiltration pond. The pump and treatment system was constructed in 1987; however, the residents rejected the individual wells in the Franconia Aquifer because of the potential problems with iron bacteria.

In 1988, based on new toxicological information, the health-based guideline for chloroform was raised from 1.9 ppb to 57 ppb. Since the concentration of chloroform in all residential wells was below 57 ppb, the drinking water well advisories issued to the Rosemount residents were made unnecessary. However, the University decided to proceed anyway with its plan to provide the residents with an alternate, long-term water remedy - a community rural water supply. The water supply consisted of two wells housed in separate pump houses drilled in the Jordan Sandstone Formation with distribution lines to the 27 residences whose wells had drinking water well advisories previously issued by the Minnesota Department of Health (MDH). The construction of the water supply began in 1989 and was completed in 1991. The Site ROD memorialized the selection of the final OU1 RA to be the ground-water pump and treatment system combined with the community rural water supply. This RA was selected even though by the time the ROD was written the University had no legal obligation to proceed with the water supply. The pumpout system had been continuously operational and continues to operational. The pumpout system effectiveness had been evaluated and lateral migration of COC's had been effectively controlled by the groundwater pumpout system.

The MPCA staff approved the shutdown of the pump and treatment system on October 30, 1991. After the issuance of the Site ROD, the MPCA staff required continued ground-water monitoring of the Site. The ground water results indicate that the ground water has remained potable.

#### **Operable Unit 2**

During July and August 1990, the University disposed of soil contaminated with lead and copper from the GUE site. The soil contaminated with lead and copper and less than 50 ppm PCBs was disposed of at the Adams Center Landfill in Ft. Wayne, Indiana, a Resource Conservation and Recovery Act (RCRA)-permitted landfill. Soil contaminated with lead and copper and greater than 50 ppm PCBs was disposed of at the Chemical Waste Management, Inc., Landfill in Emelle, Alabama, a Toxic Substances Control Act (TSCA)/RCRA-permitted landfill. Approximately 4,384 tons of soil were removed and placed in these landfills.

In 1993, during the implementation of the remedy for OU3, the University identified and transported an additional 100 cubic yards of soil contaminated with lead in excess of 1,000 ppm (but less than 50

ppm PCBs) to the Adams Center Landfill.

During the consolidation of soil contaminated with between 10 and 25 ppm PCBs at the end of the OU3 RA, the University also placed lead-contaminated soil in GUE Deep. The release sampling results showed that the highest lead concentration found outside of GUE Deep was 669 ppm lead, with most release samples showing less than 100 ppm.

### **Operable Unit 3**

Implementation of the OU3 RA began in the summer of 1992 with the excavation of contaminated soil. The University chose Roy F. Weston, Inc. (Weston) as the RA contractor. Weston began assembly of the mobile thermal destruction unit (TDU) in December 1992; began burning clean soil in February 1993; and began incinerating contaminated soil in March 1993; and completed the incineration in July 1993. On September 24, 1993, the MPCA and EPA staff conducted a preliminary site close-out report inspection. At this time the only remaining work at the Site involved installing a fence at the GUE site and spreading topsoil, mulching and seeding the Site areas that were excavated and restored. A final close-out report inspection was conducted on September 30, 1994, and all construction activities were found to be completed.

A total of approximately 7,000 cubic yards of soil were excavated and 12,100 tons were thermally treated. Large pieces of contaminated concrete were also excavated but due to low levels of contamination these pieces were consolidated at the GUE Deep (the name given to the pit where the ash and soil contaminated between 10 and 25 ppm PCBs were placed at the GUE site) rather than incinerated because of likely damage to the rotating kiln.

In 1993 and 1994, after demobilization of the TDU, an additional 350 cubic yards of soil and concrete between 10 and 25 ppm PCBs were consolidated at the GUE Deep pursuant to the second Explanation of Significant Difference. Also consolidated in the GUE Deep were approximately 65 cubic yards of soil scrapings removed from operational areas that were contaminated with greater than 1 ppm (and less than 25 ppm) PCBs. Another 36 cubic yards of PCB contaminated soil in excess of 25 ppm PCBs discovered during release sampling was sent to the U.S. Pollution Control Inc., Grassy Mountain Facility in Clive, Utah.

By the summer of 1994, areas excavated were backfilled, compacted, and graded. A 16-inch cover of material of less than 2 ppm PCBs was placed over the GUE Deep. The top six inches of this cover was topsoil with less than 1 ppm PCBs. The cover was vegetated and a fence designed to restrict access to the GUE Deep was placed around its perimeter.

A 10-inch cover of less than 1 ppm PCBs was placed over all areas left with between 1 and 10 ppm PCBs. The top six inches of this cover was clean topsoil of less than 1 ppm PCBs. This cover was also vegetated and is over areas considered unrestricted use. Therefore, all areas outside of GUE Deep are considered unrestricted use.

At the conclusion of the TDU soil incineration, 25,000 gallons of TDU wastewater remained for on-site disposal. The wastewater met the disposal criteria of 15 ppb lead; 0.5 ppm PCBs; and no detectable dioxins or furans at a detection of 1.0 nanograms/gram/congener. The MPCA staff granted a waiver to its disposal criterion of 250 ppm chlorides for the slightly elevated levels of 229 to 472 ppm chlorides. This water was disposed of on site at the GUE.

## **V. Progress Since the Last Five-Year Review**

### **Operable Unit 1**

This is the second five-year review for the University of Minnesota Rosemount Research Center Site. The first five-year review was completed and signed in June 1997. Recommendations during the 1997 five-year review involved the continued operation of the soil and ground water remedies at the Site. There were no significant deficiencies or compliance issues found during the 1997 five-year review.

The University completed comprehensive review of the ground water. Wells have been retained to verify that the VOC concentrations continue to remain below current health standards. The University sampled monitoring well NW-28 in March of 2002 and this report was submitted to the MPCA and Minnesota Department of Health (MDH). The hazard index of monitoring well NW-28 falls below 1.0. the need for further ground water monitoring will not be necessary, because the cumulative hazard index was 0.300.

### **Operable Unit 2**

1. The University should maintain restricted access at the GUE Deep.
2. The University should develop a Site deed restriction compatible with the industrial/commercial land use scenario.

### **Operable Unit 3**

1. The University should maintain restricted access at the GUE Deep.
2. The University should develop a Site deed restriction compatible with the industrial/commercial land use scenario.

## **VI. Five Year Review Process**

The University of Minnesota Rosemount Research Center Site five year review was prepared by Gladys Beard, U.S. EPA NPL Deletion Process Manager; David Douglas, State Project Manager with the Minnesota Pollution Control Agency (MPCA); and Gordon Girtz of the University of Minnesota also assisted in the review. The five year review consisted of a Site inspection and review

of relevant documents. The final report will be available in the Site information repository for public view.

Community relations ongoing at the University of Minnesota Rosemount Research Center include responding to local resident concerns over the progress of the operation and maintenance of the remedy. A local plant manager is available to provide residents with a Site tour when appropriate. Public notice is scheduled to inform the community of significant events and progress at the Site.

## **VII. Five Year Review Findings**

### **A. Site Visit**

The University of Minnesota Rosemount Research Center Site has been visited a number of times by the State Remedial Project Manager. The most recent visit was performed on April 23, 2002, by Gladys Beard, David Douglas and Gordon Girtz. The purpose of the inspections were to assess the protectiveness of the remedy, including the presence of fencing to restrict access, and the integrity of the cap.

No significant issues were identified during the various inspections regarding the cap, or the fence. Examination of the cap revealed that there had been some minor issue of trespassing in the unrestrict area at the time of the April 2002 site visit.

The institutional controls that are in place were implemented and no activities were observed that would have violated the institutional controls. The cap and the surrounding area were undisturbed, and no new uses of remedy area were observed.

### **B. Risk Information Review**

As stated above, the Review is being conducted to determine whether the Site RAs remain protective of public health and the environment. The more specific purpose of the reviews is two-fold: (1) to confirm that the remedy as spelled out in the ROD and/or remedial design remains effective at protecting human health and the environment (e.g., the remedy is operating and functioning as designed, institutional controls are in place and are protective), and (2) to evaluate whether original clean-up levels remain protective of human health and the environment. ARARs and To Be Considered (TBCs) are key elements in fulfilling these two purposes.

The following standards were identified as applicable or relevant and appropriate requirements (ARARs) in the ROD for the Site and were reviewed for changes that could affect protectiveness:

#### **Operable Unit 1**

***Safe Drinking Water Act (SDWA) (40 CFR Parts 141 - 146)***

Establishes federal Maximum contaminant Level (MCLs) for contaminants in public drinking water supplies. This ARAR applies to any aquifer which could be used for a public water supply. The shallow aquifers are hydrologically connected to deeper bedrock aquifers which are used for public water supplies.

The aquifer that contained low levels of VOCs is potable as a public drinking water supply. No PCBs or lead have been found in the aquifer under the Site; therefore, this ARAR has been met.

#### ***Minnesota Rules Part 4717.7100 to 4717.7800***

This ARAR establishes Health Risk Limits (HRLs). A HRL is the concentration of a ground water contaminant or mixture of ground water contaminants that can be safely consumed daily for a lifetime. A HRL is expressed as a concentration in parts per billion or calculated as a “hazard index.”

The MDH developed HRLs using scientific risk assessment methods and data. The HRLs are calculated using the same methodology as for the “recommended allowable limits” (RALs), which were advisory levels MDH used before the HRL rules were promulgated. HRLs apply to private ground water drinking water wells only. Since most drinking water wells in the area surrounding area are residential, this ARAR is used to evaluate the risk of human consumption of water associated with this operable unit. The aquifer that contained low levels of VOCs is potable as a private drinking water supply; therefore, this ARAR has been met.

#### ***Minnesota Rules Chapter 7060***

Establishes uses and the nondegradation goal for ground water, as well as restoration of contaminated aquifers for use as potable water supply.

Because the aquifer that contained low levels of VOCs is potable for public and private drinking water supplies, this ARAR has been met.

### **Operable Unit 2**

#### ***Resource Conservation and Recovery Act (RCRA; 40 CFR Part 264)***

RCRA establishes requirements for removal of waste residues and soil contaminated with hazardous waste such as lead. RCRA also specifies requirements for landfills that accept RCRA hazardous waste such as lead.

As stated in the ROD, the soil clean-up requirement for lead was 1,000 ppm. This concentration was selected because Site soil contaminated with lead at concentrations below this level and tested with the extraction procedure toxicity leach test did not qualify as RCRA hazardous waste (was below 5 ppm lead), but concentrations above this level did. Release sampling indicated that the highest concentration of lead in soil outside of the GUE Deep was 669 ppm, with most release sampling

results below 100 ppm lead. Also, lead contaminated soil taken off site was placed in RCRA approved landfills; therefore, this ARAR was met.

### ***ROD Review of Additional Lead Remedies***

The University's review of a lead remedy for further remediation of the Site as specified in the ROD should be a TBC for the Site. This TBC has been met.

### **Operable Unit 3**

#### ***40 CFR Part 761, Polychlorinated Biphenyls Spill Cleanup Policy; Final Rule, dated April 2, 1987***

This rule presents the TSCA policy for the cleanup of spilled PCBs. It establishes the measures which EPA considers to be adequate cleanup for the majority of situations where PCB contamination occurs during activities regulated under TSCA. The Site clean-up levels for PCBs in soil were chosen based on this rule. Since the cleanup met the requirements of the rule and the rule is still current, this ARAR has been met.

#### ***Section 6(e) (1) of TSCA and the Federal PCB Regulations, 761.70 (44 FR 31542, May 31, 1979; 47 FR 19527, May 6, 1982; 48 FR 13185, May 30, 1983; 49 FR 28191, July 10, 1984; 53 FR 12524, April 15, 1988).***

Although these ARARs were not specifically cited in the ROD because it was not known at that time whether or not the PCB clean-up contractor's incinerator would have a TSCA permit, it is cited and evaluated here because the incinerator had a TSCA permit. The permit issued to Weston for the TDU used to incinerate the PCBs was issued pursuant to these laws and regulations. This permit described the operating conditions of the TDU and established the performance parameters. These operating conditions and performance parameters ensure that the incinerator operates in a manner that is protective of public health and the environment.

EPA's letter of transmittal of the permit to Weston states that "this approval is based upon the EPA conclusion that the TIS [TDU], when operated in accordance with the conditions of approval, does not present a unreasonable risk of injury to the public health or the environment."

The permit also required Weston to report performance monitoring data to EPA. During the operation of the TDU, the consultant for the University contacted EPA about EPA's review of the performance data and was notified by EPA that no noncompliance issues had been identified regarding the performance of the incinerator. On March 20, 1997, the MPCA staff contacted Hiroshi Dodahara, EPA's permit review engineer for this TDU, who reviewed the TDU performance data. He re-verified that no TDU nonperformance issues were identified for the operation of the incinerator at the Site.

#### ***Authorization to Install and Operate a Thermal Destruction Unit, University of Minnesota***



***Rosemount Research Station," (Authorization to Burn), dated December 27, 1991.***

In order to operate the TDU in Minnesota, the MPCA staff issued this Authorization to Burn to the University. It should be considered a TBC for the Site since it did not have the standing of a permit and was issued based on MPCA staff policy that was unpromulgated. This TBC was not identified in the ROD because the policy was not in effect at the time the ROD was written. The Authorization to Burn was modified on February 3, 1992, and August 17, 1992. These modifications reduced the scope of the MPCA staff oversight of the operation of the TDU based on additional information submitted by the University. The Authorization to Burn identified additional reporting requirements. No significant noncompliance related to the document was identified by the MPCA staff during the operation of the TDU. Therefore, these ARARs have been met.

***ROD Review of Additional PCB Remedies***

The University's review of PCB remedies for further remediation of the Site as specified in the ROD should be a TBC for the Site. This TBC has been met. See the discussion on PCB remedies in Section IV.B.

**An Additional Site TBC for All Operable Units**

***OSWER Directive 9355.7-04, "Land Use in the CERCLA Remedy Selection Process," dated May 25, 1995.***

The MPCA staff believes that this directive is a TBC for the Site. Although this guidance document is intended to be used earlier in the Superfund process, the MPCA staff believes that this directive is important in documenting the proposed future land use of the Site.

In a letter report dated April 25, 1997, the University evaluated future land use according to this directive. The University determined that the Site is not currently subject to any zoning laws. Currently, the University is studying the future land use of the Rosemount Research Center. Although the University has not yet resolved the future land use of the Site, the University expects that the Site will remain industrial/commercial for the next five years. This letter report was approved by the MPCA staff on May 9, 1997. Therefore, the Site cleanup is consistent with the future land use of the Site and this TBC has been met.

**Data Review**

Ground water monitoring has been performed at the University of Minnesota Site to determine the trend of groundwater contaminants at the Site. Groundwater sampling which began March 2000 and continued till March 2002 provided the following information.

Abandonment activities conducted in 1998 through 2000 resulted in the sealing of 40 monitoring wells across the site. Eleven monitoring wells remain active, including five wells retained by the

University to monitor this investigation, and two wells that will likely be abandoned in the future. Four additional wells are used for monitoring a separate investigation.

Ground water beneath the site is encountered at depths of approximately 27 to 73 feet below ground surface. Between March 2000 and January 2002, the ground water surface elevation as measured in the wells exhibited a net change ranging from a decrease of 0.01 feet to an increase of 0.17 feet. Ground water flow is toward the northeast with a gradient of 0.004, which is similar to historical groundwater flow patterns observed at the site.

Monitoring wells MW-21D, MW-22, MW-23D, MW25, and MW-28 were sampled by Matrix Technologies, Inc. on January 17 and 18, 2002, and the ground water samples were submitted to Pace Analytical Services, Inc. for VOC analysis. The results of the laboratory analysis indicate that chloroform was detected in ground water samples collected from all five monitoring wells at concentrations ranging from 2.3 to 23 micograms per liter ( $\mu\text{g/l}$ ), less than the MDH drinking water criteria of 60  $\mu\text{g/l}$ . Trichloroethene was detected in MW-23D at a concentration of 2.6  $\mu\text{g/l}$ , less than the MDH drinking water criteria of 30.

The Cumulative Hazard Index (CHI), was calculated for all wells using the recent data and compared to historical CHI results. None of the five monitoring wells currently has a CHI result of greater than 1, the level indicating an excessive cancer risk due to multiple VOCs.

## **VIII. Assessment**

The following questions address the issue of protection of human health and the environment by the remedy at the University of Minnesota Superfund Site.

### **Question A: Is the remedy functioning as intended by the decision document?**

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD and as modified by the ESDs. The disposal of soil along with the capping and consolidation of contaminated soils has achieved the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in soil. The effective implementation of institutional controls, Environmental Restrictive Covenant and Deed Notice, has prevented exposure to, or ingestion of, contaminated soil.

The pump and treatment system that was constructed in 1987 was shutdown on October 30, 1991. The system was implemented in order to improve the performance of the Site remedy. The ground water contamination has been decreasing and are below MCLs for individual compounds.

Soil was excavated, burned and removed from the University of Minnesota Site. The excavations were backfilled with topsoil, mulched and seeded. The excavated areas were

restored.

The institutional controls are in place. No activities were observed that would have violated the institutional controls. The cap and the surrounding area were undisturbed.

**Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?**

There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

**Changes in Standards and To Be Considered:** Neither federal MCLs nor State ground water standards for Site related contaminants have changed since the ROD and the last five-year review in 1997. RCRA regulations regarding hazardous waste at the University of Minnesota remain unchanged.

**Changes in Exposure Pathways:** No new exposure pathways have been discovered at the University of Minnesota Site. The pump and treatment system was shutdown in 1991. The contaminants of concern with in the ground water are less than the MDH drinking water criteria. Well abandonment activities of wells have been going on since 1998.

**Changes Toxicity and Other Contaminant Characteristics:** Toxicity and other factors for contaminants of concern have not changed.

**Changes in Risk Assessment Methodologies:** No additions or changes in risk assessment methodologies used at the Site since the ROD have occurred which affect the protectiveness of the remedy.

**Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

No weather related events have affected the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

**Technical Assessment Summary**

According to the data reviewed, the site inspection, and interviews with the MPCA staff, the remedy is functioning as intended by the ROD and as modified by the ESD. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. All ARARs for soil and ground water contamination cited in the ROD have been met.

## VIII. Issues

If the university intends to redevelop the site then the site should be cleaned up to meet standards depending on future use.

The UM shall maintain restricted access of GUE Deep.

Propose that the UM abandon and seal wells, because all groundwater contaminants are below MDH drinking water criteria.

## IX. Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone	Affects Protective ness? (Y/N)
If the university intends to redevelop the site then the site should be cleaned up to meet residential standards	The university should discuss with the State	UM	State/EPA	Annual review	Y
Maintain restricted access of GUE Deep	Discussion of ongoing monitoring	UM	State/EPA	Annual review	N

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone	Affects Protective ness? (Y/N)
Propose that UM abandon and seal wells, because all ground water contaminants are below MDH drinking water criteria.	UM discuss with state agency	UM	State/EPA	Annual review	N

#### **X. Protectiveness Statement**

The remedy is protective of human health and the environment, the ground water and soil have meet cleanup goals. The exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated ground water or soil. All threats at the site have been addressed through capping of contaminated soil, a pump out and air stripper treatment system, the installation of fencing and implementation of institutional controls. Current data indicate that the plume remains on site and the remedy is functioning as required.

#### **XI. Next Review**

The next five-year review for the University of Minnesota Rosemount Research Center Site is required by June 30, 2007.